

INTEGRATED SEGMENTED AND INTERDIGITATED BROADSIDE- AND EDGE-COUPLED TRANSMISSION LINES

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ABSTRACT

5 A combination edge- and broadside-coupled transmission line element formed
in an integrated circuit chip, using semiconductor processes, in a stack of metal layers
separated by dielectric layers. Each of the metal layers includes a number of
transmission lines. Interconnects between the transmission lines are formed at
predetermined locations, each interconnect electrically connecting together a group of
10 the transmission lines to form a conductor. The efficiency of the coupling between the
lines in the different conductor is increased by positioning the lines such that both edge-
and broadside-coupling is realized. For example, at least one of the transmission lines
in one of the conductors is positioned either above or below a transmission line in the
other conductor to achieve broadside-coupling and laterally adjacent to another
15 transmission line in the other conductor to achieve edge-coupling. In a preferred
embodiment each of the lines in one of the conductors is edge- and broadside-coupled
to lines in the other conductor. The transmission line element may contain two, three or
more conductors, and each conductor may contain two, three or more transmission
lines. The transmission line element can be used, for example, to fabricate various
20 types of balanced and unbalanced transformers.